

# Patterned coating by suspensions

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## Abstract

This file describes “Patterned coating by suspensions”, a fluid dynamics video submitted to the Gallery of Fluid Motion of the 63rd Annual Meeting of the American Physical Society Division of Fluid Dynamics.

We examine the Landau-Levich flow of a suspension of neutrally buoyant particles within a rotating glass cylinder. This differs from previously investigated systems [1, 2] in that we deal with macroscopic particles which immediately exceed the thickness of the deposited liquid film. Thus, the presence of particles on the liquid-coated wall creates excess surface area, leading to a capillary attraction between particles. In turn, this capillary attraction induces phase separation of the suspension coating into regions of either dense particle clustering or clear liquid.

With the exceptions of the opening and closing credits, video in this submission is of  $\sim 200\mu\text{m}$  polystyrene beads suspended in a mixture of water, sodium chloride, and Tween 20, with density  $\rho = 1.05\text{ g/L}$ . These sequences were filmed at 300 fps and are played back  $10\times$  slower. The credits sequences are of  $\sim 430\mu\text{m}$  particles in a mixture of the same components, with the addition of polyvinylpyrrolidone (Sigma PVP360) for increased viscosity, recorded at 300 fps but played back in real time.

## References

- [1] N. D. Denkov, O. D. Velev, P. A. Kralchevsky, I. B. Ivanov, H. Yoshimura, and K. Nagayama. Two-dimensional crystallization. *Nature*, 361:26, 1993.
- [2] M. Buchanan, D. Molenaar, S. de Villiers, and R. M. L. Evans. Pattern formation in draining thin film suspensions. *Langmuir*, 23:3732–3736, 2007.